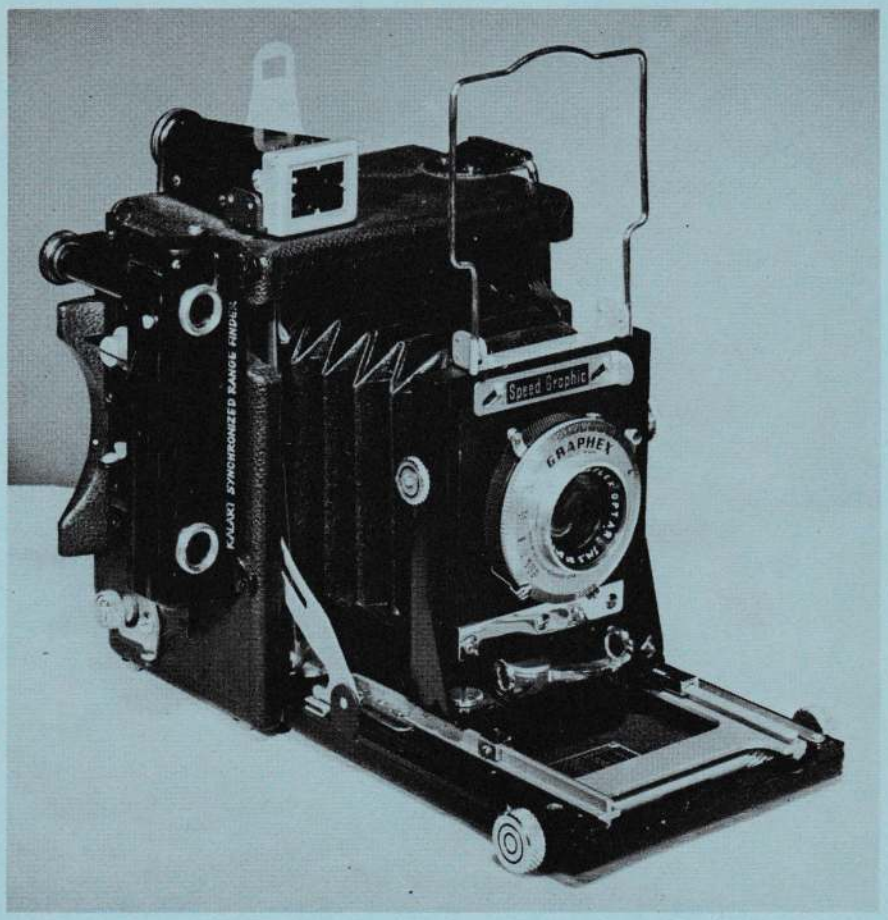
Section 1

2 1/4 X 3 1/4 MINIATURE SPEED GRAPHIC



Bellows: 2 1/2 in. min. to 9 in. max.

Lensboard: 2 1/4 in. square, Model H. (Cat. No. 9249)

Lens limit: 2 1/16 in. max. dia. rear element
1 in. forward from lensboard to closed bed

GRAFLEX, INC.
Rochester 8, New York

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Optical Viewfinder - Refer to Section 102

Miscellaneous Parts

Special precautions for:

1. Bellows
2. Folding peepsight
3. Stationary yoke alignment

1. Bellows (#24380).

Removal

a. Remove the back of the camera secured by five screws. (Four #2-56 x 3/16" binding head screws, #110B2-3, and one #1 x 1/4" flat screw, #150B1-4.)

b. Remove the inside idler frame assembly (#24371) by removing the three #2 x 3/4" flat head screws (#150B2-12).

c. The tabs of the rear bellows frame may now be pryed up on three sides and the bellows and front standard removed at the front of the camera. Working inside of the bellows, remove four screws, part #29796, which secure the front bellows frame at each corner of the lensboard frame.

Replacement

d. Assemble the new bellows with the seam to the bottom. First, secure to the front frame with four screws (#29796); then position the rear bellows frame so that the tabs may be crimped to the camera partition plate.

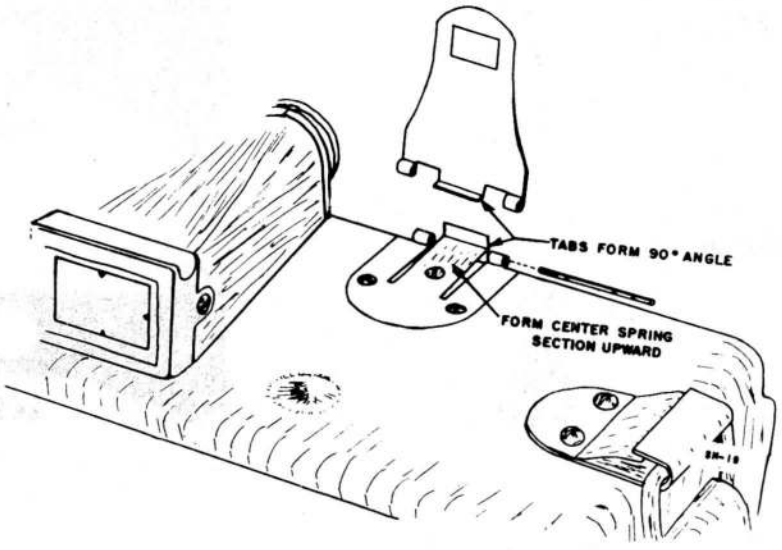
e. Replace the inside frame securely against the partition plate and replace the screws. Straighten and adjust the shutter curtain squarely on the rollers. Reassemble the idler frame and the back.

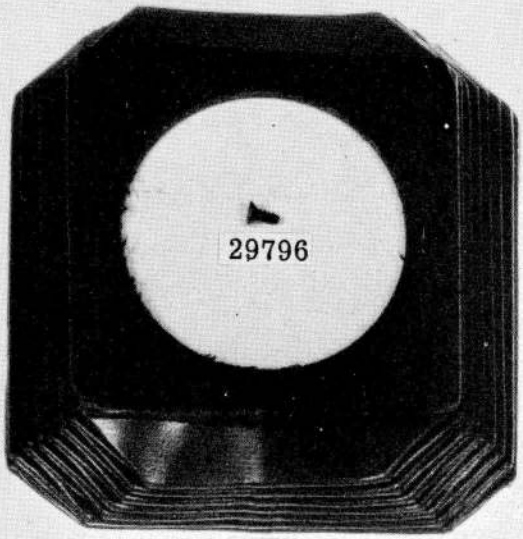
2. Folding peepsight (#24387).

If the peepsight should develop excessive play, remove the hinge pin, reform each of the right angle tabs to form 90 degrees, and form the center section of the base plate upward about 1/32" above the outside section. Reassemble.

3. Stationary yoke alignment (#24393).

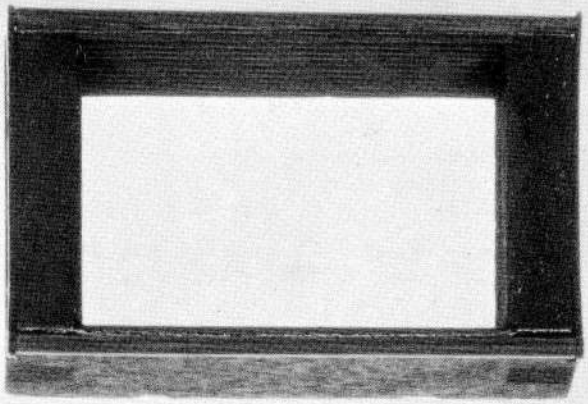
The stationary yoke (#24393) may be aligned with the bed yoke by using stationary yoke shim (#24459) as required. Check the alignment by the use of a straight edge on the bottom of the camera and by laying on the top of each side of both yoke section.





29796

24380

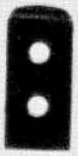


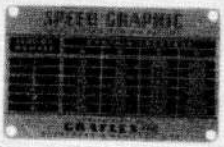
24371

150 B2-12

24387

152 B1-3





25060

30084

150 B3-4

24484

150 B1-6

152 B1-6

150 B2-4

2071 - SIDE
16004 - BOTTOM

24393

152 B1-4

24679

151 B2-4

24407

24459

SM-1

Miscellaneous Camera Body Parts

			List Price
150 B1-6	Screw - Stationary yoke to body	(3/8" #1 FH P22)	$ .03
150 B2-4	Screw - Tripod nut	(1/4" #2 FH L12)	.03
150 B2-12	Screw - Idler frame to body	(3/4" #2 FH S18)	.03
150 B3-4	Screw - Bed stop to body	(1/4" #3 FH L17)	.01
151 B2-4	Screw - Bed release spring	(1/4" #2 RH L17)	.03
152 B1-3	Screw - Peepsight to body	(3/16" #1 OH P19)	.03
152 B1-4	Screw - bed catch to body	(1/4" #1 OH L5)	.03
152 B1-6	Screw - Stationary yoke to body	(3/8" #1 OH P22)	.03
2071	Nut - Side tripod	(use screw 150 B2-4)	.15
16004	Nut - Bottom tripod	(use screw 150 B2-4)	.15
24371	Idler frame assembly - case inside	(use screw 150 B2-12)	2.25
24380	Bellows	(use front screw 29796)	5.75
24387	Peepsight finder assembly		1.15
24393	Yoke - stationary		2.25
24407	Spring - bed release	(use screw 151 B2-4)	.20
24458	Stop - bed		.10
24459	Shim - stationary yoke	(as required)	.07
24484	Foot - camera body		.07
24679	Catch - bed	(use screw 151 B2-4)	.10
25060	Plate - shutter speed	(use pin 30084)	.15
29796	Screw - Bellows to front frame	(#2 FH Z Parker Kalon)	.01
30084	Pin (tack) - shutter speed plate to body		.01

Order by part number and complete name. State quantity.

Prices are subject to change without notice.

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6. Bed inspection check list.

Check	Adjustment
a. Open bed, bed brace arms should not scrape camera body.	Unhook brace from stud and reform at bed ear.
b. Bed brace lock.	Open the bed brace spring (24343 and 24344)
c. Slide front standard from stationary yoke to sliding yoke. No alignment differences should be noticed.	Tighten yoke guide screws, stationary yoke screws, or shim stationary yoke.
d. Yoke tension, tip camera forward, yoke should hold.	See paragraph 1.
e. Yoke binds.	Remove yoke and check flatness.

7. Focusing scale.

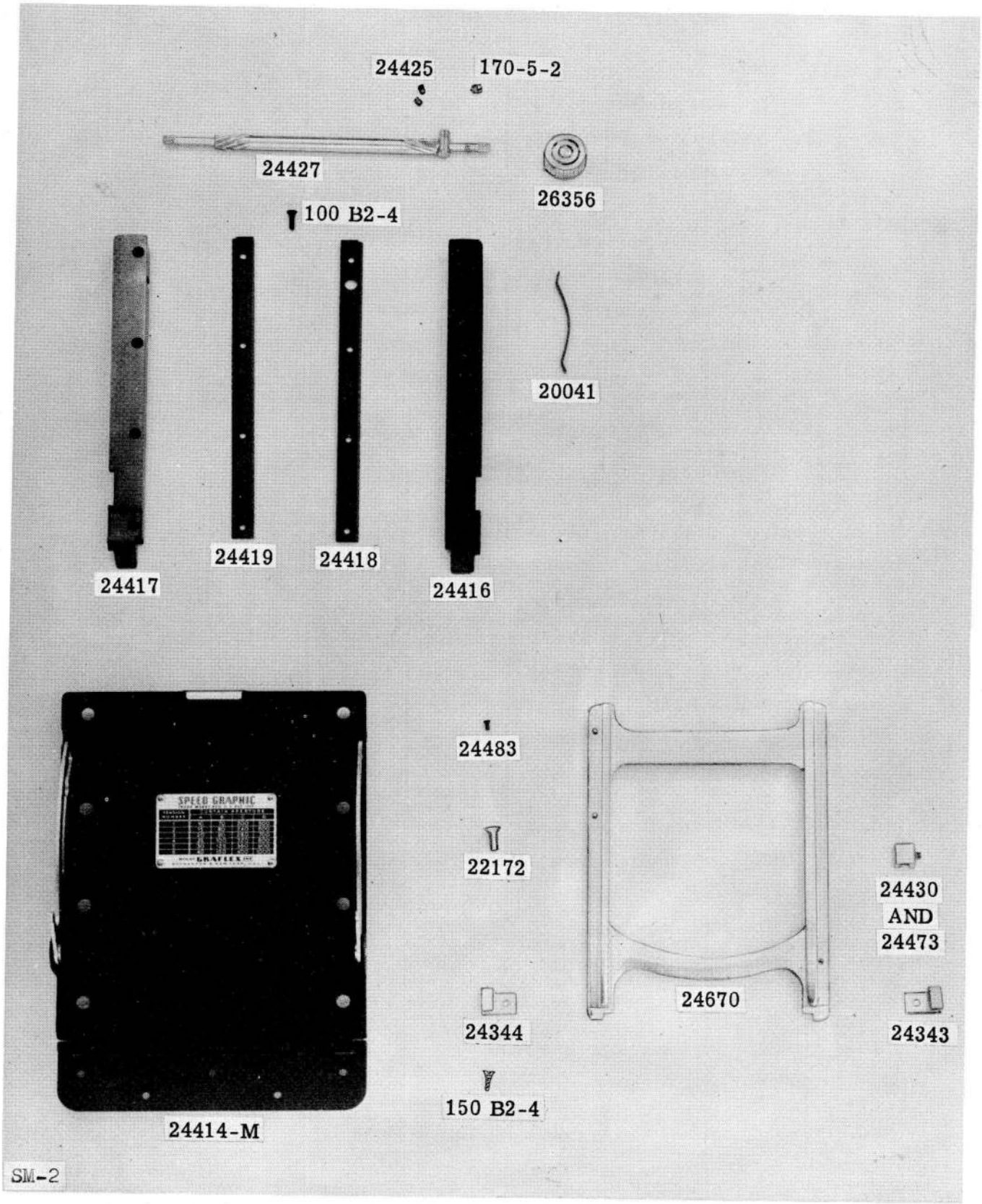
For information pertaining to focusing scales, refer to Section 101.

			List Price
24414		BED ASSEMBLY COMPLETE (Includes the thirteen items below)	$24.00
	100 B2-4	Screw - Yoke guide (1/4" #2-56 FH L5)	.01
	20041	Spring - Focusing shaft	.03
	22172	Bushing - Guide screw	.01
	24343	Spring - Bed brace, right	.20
	24344	Spring - Bed brace, left	.20
	24379	Covering (Not Illustrated)	.85
	24414-M	Bed Assembly (as illustrated)	5.00
	24416	Block - Right bed	.30
	24417	Block - Left bed	.30
	24418	Guide - Right bed yoke	.65
	24419	Guide - Left bed yoke	.65
	24428	Focusing pinion complete (Assembly of four parts below)	2.90
		170-5-2 Screw - Tension (1/8" #5-40 headless-P22)	.05
		24425 Pad - Tension shaft	.01
		24427 Shaft assembly (order 24428)	
		26356 Knob	.25
	24670	Yoke - Sliding	8.40
150 B2-4		Screw - Bed hinge and brace to body (1/4" #2 FH L12)	.03
24430		Stop - Infinity, right or left (order screw 24473)	.70
24473		Screw - Infinity stop (1/8" #4-48 Headless P22)	.03
24483-P2		Screw - Focusing scale	.05
24673		Plate - Bed brace	.15

Order by part number and complete name. State quantity.

Prices are subject to change without notice.

193-355


24425
170-5-2
24427
26356
100 B2-4
20041
24417
24419
24418
24416
24483
22172
24430
AND
24473
24670
24344
24343
150 B2-4
24414-M
SM-2

2¼ x 3¼ MINIATURE SPEED GRAPHIC

Bed Assembly

Special precautions for:

1. Focusing pinion tension
2. Bed block or guide replacement and adjustment
3. Focusing pinion replacement
4. Sliding yoke replacement
5. Bed replacement and alignment
6. Bed inspection check list
7. Focusing scale

1. Focusing pinion tension.

If the tension adjustment screw (#170-5-2), located on the right side of the pinion is tightened, the tension on the pinion should increase; however, if the tension does not increase, the tension pads (#24425) will need to be replaced. The tension should be just enough to hold the yoke with front standard when the camera is tilted forward.

2. Bed block or guide replacement and adjustment.

a. Remove the focusing scale from the left guide, remove the bed brace from the brace stud, remove the rangefinder attachments on the right guide, and slightly bend the bed brace ears outward for clearance of the block. The block or guide may now be removed.

b. Reassemble the bed block, being sure to position the focusing shaft spring beneath the focusing pinion shaft and to locate the spring in the block cutout. Replace the guide screws (#100B2-4) and then, it will be necessary to spread the bed blocks with wood strip spreaders 3-3/16" long, and at the same time, hold the yoke guides with pressure against the yoke; tighten the screws on each side. Check yoke alignment.

c. Lubrication: Wipe thin film of wax base lubricant on yoke guide grooves.

3. Focusing pinion replacement.

a. See paragraph 2a above concerning disassembly.

b. Assemble the focusing pinion assembly (#24428) with the tension post to the right. Reassemble the bed as instructed in paragraph 2b and adjust the tension screw so that the yoke will not slide freely or accidentally if the camera is tipped forward when the standard has been moved forward to the sliding yoke.

c. Lubrication: Apply wax base lubricant lightly on bearing shaft and helical teeth.

4. Sliding yoke replacement.

a. Remove the index focusing scale, the rangefinder arm actuating plate, and the two infinity stops for transfer to the new yoke after its assembly. Unhook the bed brace arms from the bed brace plates to swing the bed free. Withdraw the sliding yoke from the back of the bed, insert the new yoke, reassemble the stops, scale and actuating plate; and if necessary adjust the guide tension as instructed in paragraph 2b of this section.

b. Lubrication: Wipe thin film of wax base lubricant on the guide ridge and lubricate the teeth sparingly with the same lubricant.

5. Bed replacement and alignment.

The bed assembly (#24414) is secured to the camera body by five #2 x 1/4 flat head screws (#150B2-4) located beneath the leather covering on the camera bottom. When replacing the bed, position in the closed position and center squarely. If the top edge of the bed does not clear freely, it will be necessary to insert a shim (of fibreboard) of sufficient thickness between the hinge and body. Position the bed brace arms over the side plate studs and check the alignment of the bed by laying a straight edge across the bottom. Any adjustment will have to be made by slight relocation of the bed brace plates. If the stud should be lowered, remove the top screw, plug the hole, readjust the bed in proper alignment, and replace the screw centered in the hole. If the stud should be raised, remove the lower screw and proceed as before.

(Cont. on page 4B)

Front Standard, Open Finder, Handle

Special precautions for:

1. Front standard
2. Open finder
3. Handle

1. Front standard.

The front standard spring (#24394) is the only replaceable part that will improve the clamping action of the front standard.

NOTE: Do not attempt to remove the large slotted screw located inside the right upright of the front standard -- it is staked.

Lubricate the front standard by wiping a thin film of wax base lubricant on the inside channels.

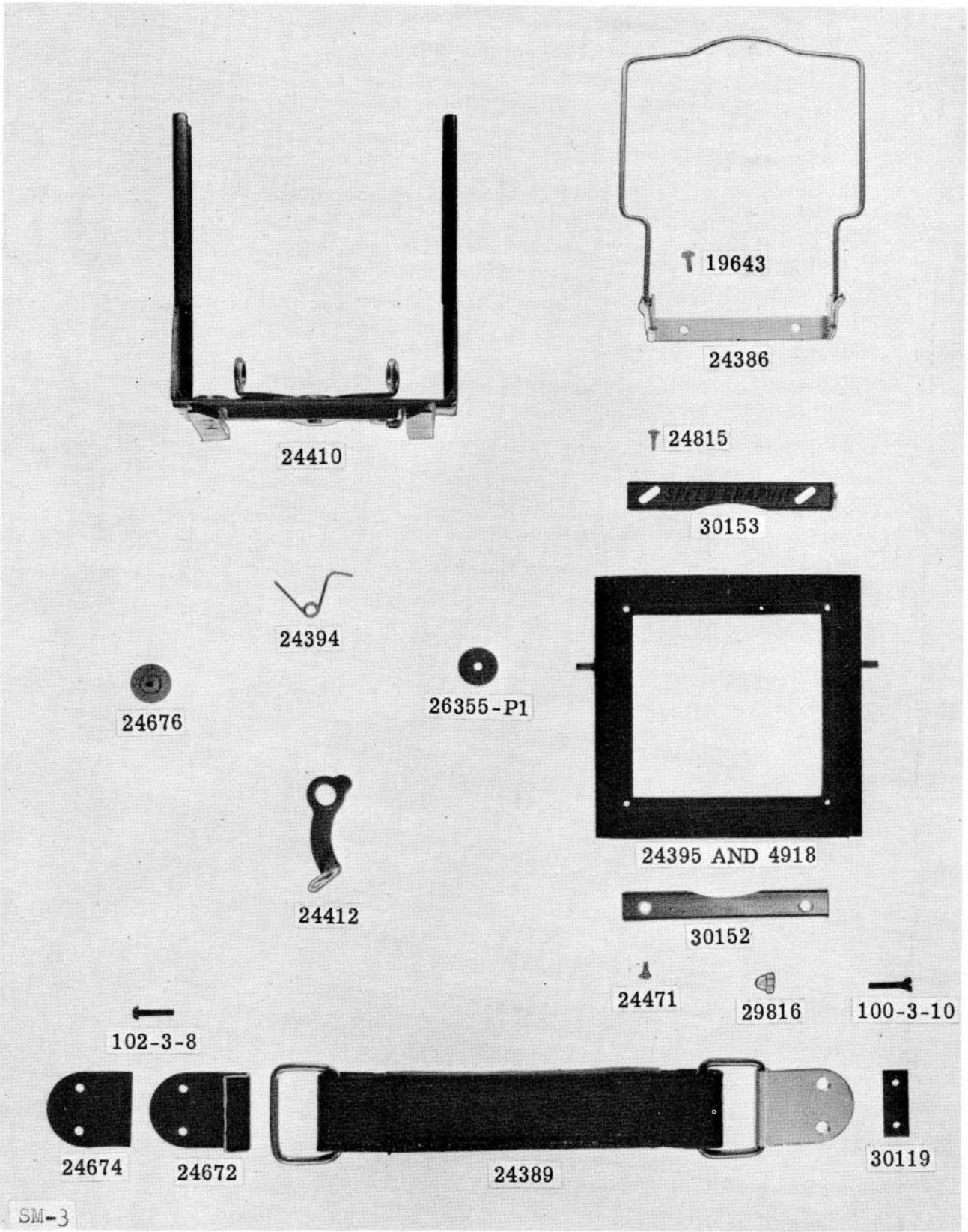
2. Open Finder.

Note the squareness (vertical) of the wire frame in the "up" position. If necessary, reform at a point about 1/2" above the pivot.

Lubricate the open finder with wax base lubricant at the pivot points -- wipe off excess.

3. Handle.

Early models of this camera use wood screws to secure the handle plates. To use the retaining plates, (#25096) and machine screws (#100-3-10 and #102-3-8) that are listed, drill through the center of the wood screw hole with a .099" diameter (#39) drill and assemble the machine screws into the retaining plate (#25096) which is positioned inside the case.


19643
24386
24410
24815
30153
24394
24676
26355-P1
24395 AND 4918
24412
30152
24471
29816
100-3-10
102-3-8
24674
24672
24389
30119
SM-3

		List Price
24408	FRONT COMPLETE (Includes 24409, 24410 and 26355-P1)	$13.25
24409	Lensboard Frame Assembled (Includes six items below)	3.35
4918	Pin - Slide lock centering	.01
24395	Frame (with inserts) (order pin 4918)	1.60
24471	Screw - Retaining strip (3/16" #2 OH Parker Kalon)	.04
24815	Screw - Slide lock	.10
30152	Strip - Lensboard retaining	.30
30153	Slide lock - Lensboard	.35
24410	Standard Complete (As illustrated)	7.50
24394	Spring - Front standard slide	.05
24412	Finger pull - movable	.85
24676	Rivet - movable finger pull	.15
26355-P1	Nut - Rising front lock (Order replacement)	See below
24386	WIRE FINDER FRAME ASSEMBLY	1.85
19643	Screw - Finder frame (3/16" #2 RH, Z, Parker Kalon)	.05
24389	HANDLE ASSEMBLY (Non-adjustable)	3.50
	PARTS FOR ATTACHING HANDLE ASSEMBLY (24389)	
100-3-10	Screw - Handle lug (5/8" #3-48 FH-P19)	.04
102-3-8	Screw - Handle catch (1/2" #3-48 FH-P19)	.03
24672	Catch - Handle	.25
24674	Spring - Handle catch	.25
25096	Plate - Handle reinforcement (Tapped for #3-48 screw)	.20
29816	Nut - Acorn (Use with plate 30119)	.05
30119	Plate - Handle reinforcement (Not tapped. Use with acorn nut)	.20

SUBSTITUTE REPLACEMENT PARTS

Parts as Listed	Order as Replacement	
26355-P1	30444-P1 Nut - Rising Front Lock	.25

Order by part number and complete name. State quantity.

Prices are subject to change without notice.

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GRAPHIC Back

Special precautions for:

1. Focusing panel springs
2. Ground glass replacement (also panel catch)
3. Panel door spring (also panel door)
4. Panel door shields
5. Synchronization contacts
6. Back lugs and screws
7. Graflok Back

1. Focusing panel springs.

NOTE: The bottom and top focusing panel springs (#24317 and #24318) are not interchangeable -- to determine, position the ear with the elongated slot on the right and lastly, the straight edge will be to the center.

The springs are secured to the focusing panel at each end by a #1 x 3/8" round head screw (#151B1-6); in turn, the panel and springs are secured to the back by a #4-40 x 1/4" round head screw (#20608) inserted through the center hole of the spring, through a washer, part #15851, and into the back moulding bushing.

2. Ground glass replacement (also panel catch).

a. Open the panel door and on each side remove the metal side shield retaining strip, part #24315, which is secured by four #0 x 3/8 flat head screws, part #150B0-3.

b. At this point, check catch, panel wing shield and door spring for replacement.

c. Position the ground glass (#24314) with the grain surface toward the lens. Clinch the panel wings beneath the retaining strips and tighten the screws uniformly to avoid cracking the glass.

3. Panel door spring (also panel door).

a. To replace either of the panel door springs (#845) it will be necessary to remove the door from the focusing frame. Proceed by removing the retaining strip (#24315) from each side of the ground glass; then, lift the leather covering at the hinge and remove four #1 x 1/4" flat head hinge screws (#150B1-4).

b. Drive out the hinge pin to remove broken spring. Position the new spring so that the straight ends extend inward without tension. Grasp one straight end and pull 1/8" - 1/4" to place tension on the spring. If the tension is sufficient to lift the door, form offset on each terminal so that it will lay flat against the hinge; then, cut off excess of 3/16".

c. Reassemble the door, check the catch and, if necessary, adjust its arch before reassembling the ground glass.

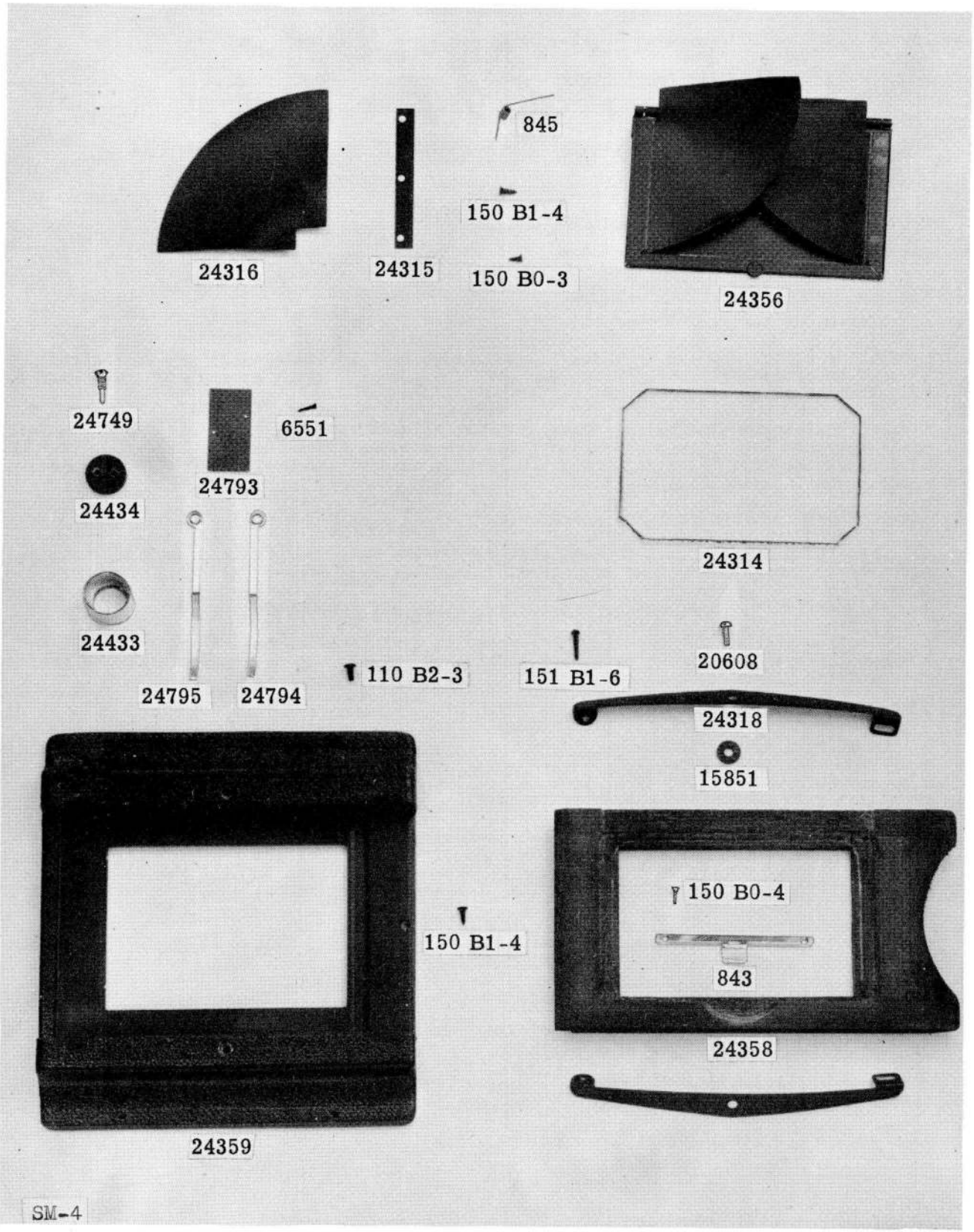
4. Panel wing shields.

a. To replace a panel wing shield (#24316) remove the corresponding retaining strip and pry up the metal lip of the door slightly.

b. Clean the metal opening; apply cement 3/16" wide to both sides of one straight edge; insert this cemented edge in the lip and peen the lip which clamps the new shield.

c. Replace the retaining strip.

(Cont. on page 4D)


24316
24315
845
150 B1-4
150 B0-3
24356
24749
24793
6551
24434
24314
24433
24795
24794
110 B2-3
151 B1-6
20608
24318
15851
150 B0-4
843
150 B1-4
24358
24359
SM-4

			List Price
Cat. No. 9110	GRAPHIC BACK COMPLETE (Includes 24357 and 24359 assembled) (Obsolete, replaced by Graflok Back Cat. No. 9297, See page 4D)		See below
24357	FOCUS FRAME ASSEMBLED	(Includes the fourteen parts listed below)	$8.75
150 BO-3	Screw - Ground glass retaining strip	(3/16" #0 FH L5)	.01
150 BO-4	Screw - panel catch to frame	(1/4" #0 FH P22)	.01
150 B1-4	Screw - panel hinge to frame	1/4" #1	.01
151 B1-6	Screw - spring to frame	(3/8" #1 RH L5)	.03
843	Catch - panel		.15
24314	Ground Glass - focusing		.55
24315	Retaining strip - glass	(Use screw 159 BO-3)	.00
24317	Spring - bottom of focusing panel		.32
24318	Spring - top of focusing panel		.30
24356	Panel door assembly (not leather covered)		1.20
845	Spring - panel door		.08
24316	Shield - panel wing		.13
24358	Frame	(not leather covered)	Not Procurable
24362	Covering	(frame and panel assembly)	.60
24359	BACK FRAME ASSEMBLY	(Includes six parts listed below)	Not Procurable
*24433	Ferrule - synchronizer		.24
*24434	Insulator - synchronizer		.07
*24749	Screw - synchronizer contact	(order strip 24793)	.08
*24793	Strip - insulator		.04
*24794	Spring - right synchronizer contact	(order strip 24793)	.05
*24795	Spring - left synchronizer contact	(order strip 24793)	.05
110 B2-3	Screw - back to body	(3/16" #2-56 Bind H L19)	.01
150 B1-4	Screw - back to body	(1/4" #1 FH L17)	.01
15851	Washer - spring screw		.03
20608	Screw - panel spring to back	(1/4" #4-40 RH L12)	.01

(Cont. on page 4D)

Order by part number and complete name. State quantity.

Prices are subject to change without notice.

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			List Price
Cat. No. 9297 GRAFLOK BACK COMPLETE - 2¼ x 3¼			See Price List

Refer to Section 4 to order parts except for the following items:

Pacemaker Part as Listed	Order this Anniversary Part		
30921-P6 (figure 8-2)	110 B2-3	Screw - Upper mounting (3/16" #2-56 Bind H Brass)	.01
30921-P7 (figure 8-1)	110 B2-3	Screw - Lower mounting (3/16" #2-56 Bind H Brass)	.01
31713-P1 (figure 8-17)	31713-P2	Slide lock - Lower	.85
31713-P2 (figure 8-14)	31713-P3	Slide lock - Upper	.85
31714-P1 (figure 8-15)	31714-P2	Spring - Lower	.15
33836-G1	31895-G1	Back Assembly	7.75
Not used on Pacemaker	30473-P42	Washer - Slide lock (1/4" OD, .099" ID, .016" thk. Brass)	.01
Not used on Pacemaker	24438	Strip - Insulator, long (mounts between contact springs #24794, 24795 and back assembly 31895-G1. See note*)	.40

*These parts are also used on the Graflok Back Cat. No. 9258.

5. Synchronization contacts.

NOTE: The spring contacts are not interchangeable -- it is easily noticed that the holes are not centered and are mounted with the narrow edges facing.

a. The contact springs (#23794 and #24795) should be positioned parallel to the side of the back -- after the synchronizer contact screws are assembled, a new insulator strip (#24793) should be cemented and tacked in place. Check for shorts between the contact springs and either of the springs and the back frame or ferrule.

b. The Anniversary Graflok Back utilizes a long insulator strip (#24438) between contact springs (#24794 and #24795) and Back Assembly (#31895-G1).

c. The removal of one of the synchronizer contact screws (#24759) or the ferrule (#24433) require the same disassembly, reassembly and check that is mentioned above in paragraph a.

6. Back lugs and screws.

If the threads of the back lugs, positioned in the camera body beneath the leather, should be stripped by over turning or cross-threading the back screw (#110B2-3), it will be necessary to retap the lug with a #3-48 tap and use a #3-48 x 3/16" binding head screw. (Order screw #112B3-3, S-18 finish; or cut off handle catch screw to 3/16" long.)

7. Graflok Back.

a. Refer to Section 4 for disassembly and reassembly of the Graflok Back.

b. The synchronization components of the Graflok Back are the same as where used on the Graphic Back. Refer to paragraph 5.

c. Descriptions of mounting screws, shown in figure 4-1 and 4-2 in text of Section 6, are not accurate descriptions of screws used on the Anniversary Graflok Back - See parts list of this section.

Focal Plane Shutter

Special precautions for:

1. Curtain setting plate
2. Tension setting plate
3. Curtain and roller replacement

Special tools: Tension setting clamp, #28452

Tension lock nut wrench, #28442

All metal parts of the shutter plates may be immersed in cleaning solvent - dry before reassembly and lubricating as recommended below. Remove excess lubricant and never allow any lubrication to come in contact with shutter curtain.

1. Curtain setting plate, (#24323)

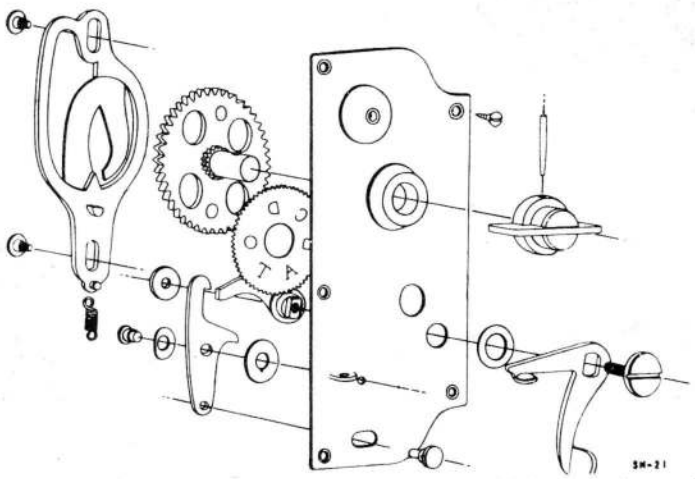
a. Remove the back. (see page 1A, par. 1a)

NOTE: Set the curtain at "0" (full open aperture) and mark the position of the top curtain strut on one side of the camera body.

b. From the curtain setting plate, remove the five #1 x 1/4" oval head screws (#152 B1-4). Note any spacer washers (#20600) that may be placed at either end of the roller.

c. If it is ever necessary to remove the release lever (#22015) file off the peened end of the release lever screw (#24665). Reassemble, peen nut, and check for binding of bushing or over tightened screw.

d. Check brake spring of the escapement (#3388) in respect to its latch of the master gear stop pin. Hold the shutter release lever back and rotate the winding key until the stop pin snaps beneath the flat spring and against the escapement -- it should not be possible to reverse the winding key and force the stop pin back under the catch end of the flat spring. This spring should latch about 1/64" below the top of the pin. If it has been necessary to remove the escapement screws (#867) apply a touch of glyptol cement to the threads before assembly.

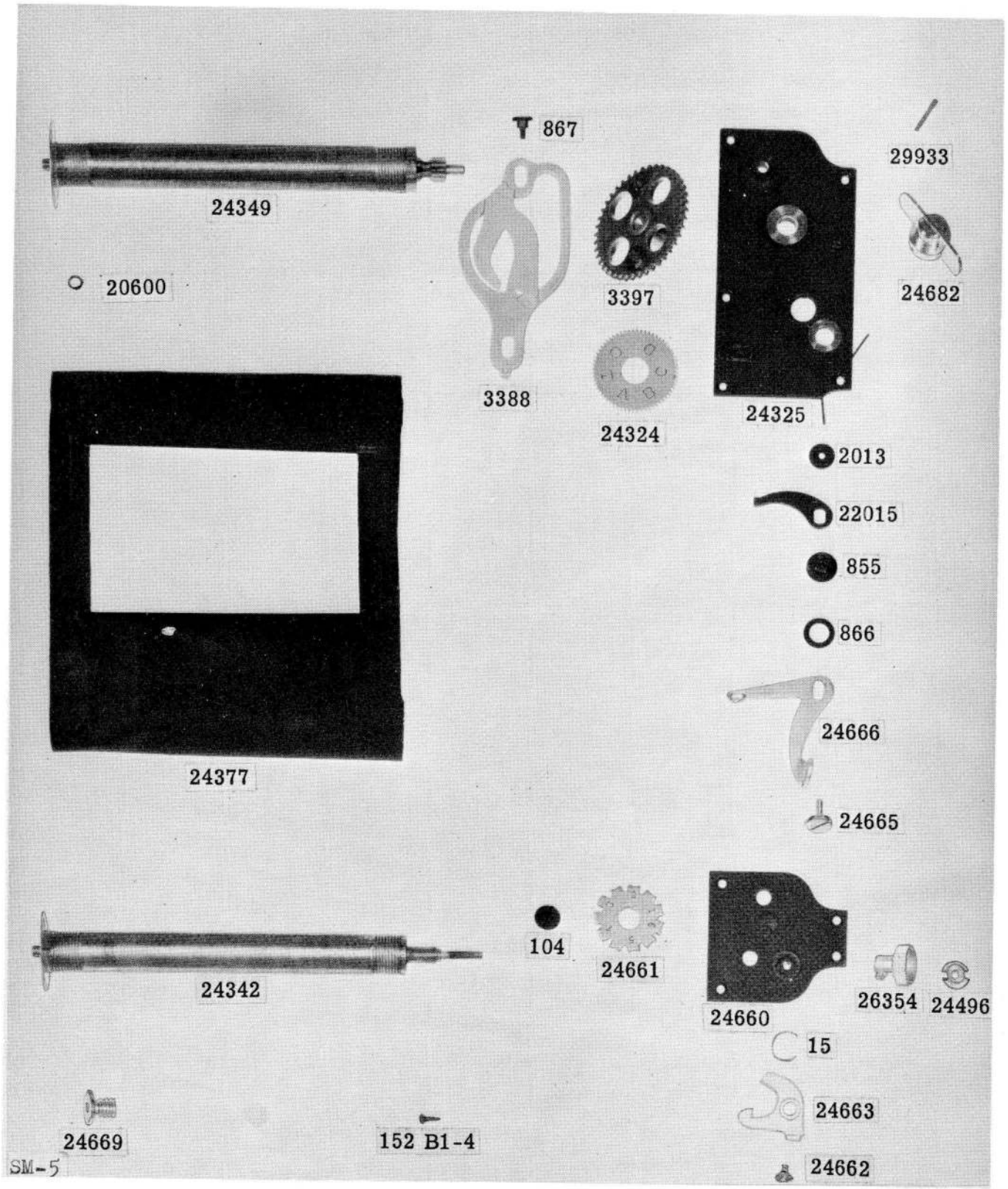


e. Lubricate the mastergear stop pins with wax base lubricant, and lubricate the curtain roller bearings and pinion with graphite grease.

f. Set the curtain setting plate so that "0" appears squarely in the indicating hole when the top gear stop pin is stopped against the escapement.

g. Wind the curtain so that its top strut lines up with the index mark on the side of the body. Hold the winding key against the stop and reposition the plate; check the side play of the roller and if more than 1/64" use spacer washer (#20600) at the case bearing end of the shaft. Reassemble two screws, test run, check the top strut and index, if satisfactory, wind the curtain and release -- note the position of each curtain strut in relation to the inside frame. If necessary, adjust by raising or lowering the pinion gear one tooth at a time.

(Cont. on page 4E)


24349
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29933
20600
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2013
22015
855
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24666
24665
24342
104
24661
24660
26354
24496
15
24669
152 B1-4
24663
24662
SM-5

			List Price
24664	TENSION SETTING PLATE ASSEMBLY		$2.40
15	Spring	- tension dog	.08
104	Screw	- tension indicator gear	.15
24496	Nut	- tension snail lock	.20
24660	Plate	- tension (order tension setting plate assembly 24664)	--
24661	Gear	- tension indicator	.50
24662	Screw	- tension dog	.08
24663	Dog	- tension	.30
26354	Snail	- tension plate setting	.40
152 B1-4	Screw - Plate to body	(1/4" #1 OH L5)	.03
24323	CURTAIN SETTING PLATE ASSEMBLY		9.80
855	Bushing	- shutter release (order 2013 and 24665)	.15
866	Washer	- release	.05
867	Screw	- escapement	.05
868	Spring	- escapement	.15
2013	Nut	- escapement lever (order 855 and 24665)	.12
3388	Escapement assembly		.40
3397	Gear	- master	1.75
22015	Lever	- escapement (order 855, 2013 and 24665)	.10
24324	Gear	- curtain slit indicator	.50
24665	Screw	- release lever (order 855, 2013)	.05
24666	Lever	- shutter release (order 855, 2013 and 24665)	.25
24682	Winding key	(order pin 29933)	.50
24325	Plate	- setting (order curtain setting plate assembly 24323)	--
29933	Pin	- winding key	.01
152 B1-4	Screw - Plate to body	(1/4" #1 OH L5)	.03
30087	CURTAIN AND ROLLER ASSEMBLY		9.25
24342	Roller Assembly - tension		2.20
24349	Roller Assembly - gear		1.75
24377	Curtain Assembly		4.70
20600	Spacer washer - curtain roller		.01
24669	Bearing	- roller	.35

Order by part number and complete name. State quantity.

Prices are subject to change without notice.

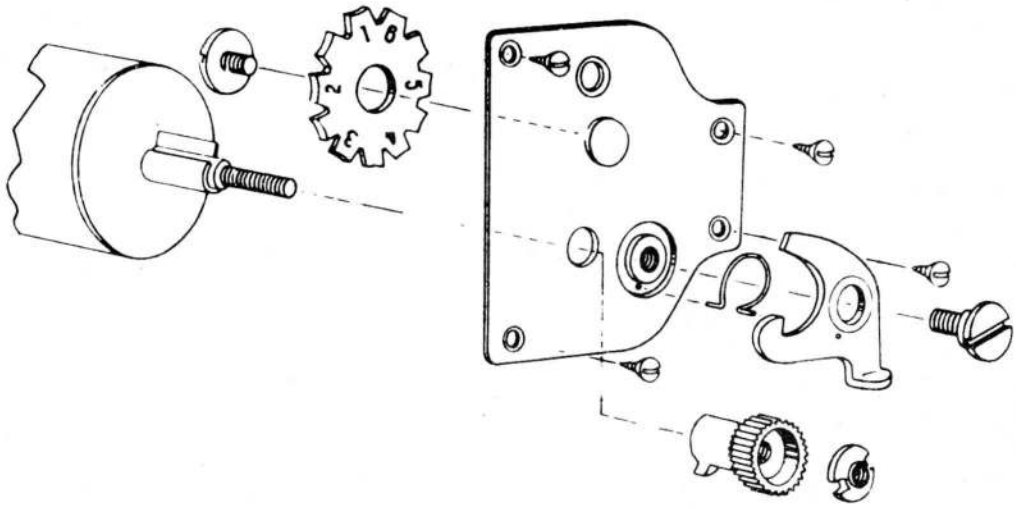
193-355

Reassemble the back (with the focusing panel removed), set the curtain slit at "A" and set the tension at "1". Release the curtain and note if it rebounds at the lower edge of the opening - this fault may be corrected by dropping the upper roller gear one tooth off the plate gear.

2. Tension setting plate (#24664)

a. The tension dog spring (15) may be replaced without removal of the plate.

b. If the entire plate is to be removed, use the special tension lock nut wrench and pliers to remove the tension snail lock nut (#24496). The tension snail (#26354) may now be unscrèwed from the tension roller shaft - it may be necessary to wind the tension to "6" before the tension roller shaft can be unscrewed. At this point the four #1 x 1/4" oval head screws (#152B1-4) are removed and the plate lifted from the camera body.



c. Lubricate the case and plate bearing points of the tension roller shaft with graphite grease; and, lubricate the internal tension spring with a few drops of light oil inserted through the left end (see paragraph 3c).

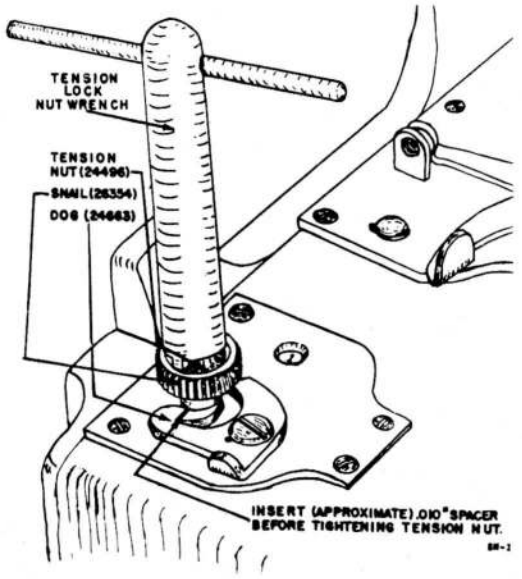
d. Reassemble the tension setting plate over the threaded end of the shaft and lock the tension setting clamp to the shaft. Check side play of the roller and if more than 1/64", use spacer washer (#20600) at the case bearing end of the shaft. Wind the spring several turns and then draw the curtain out by hand several times to remove curtain slack. Slowly release the tension - do not allow the tension setting clamp to spin free. Lift the tension plate; set the indicator gear so that "1" appears in the indicator hole; turn the one tooth of the pinion clockwise from the vertical about 30 degrees and now engage the counter gear and the one tooth pinion. If it is not possible to wind the tension to "2" the pinion and gear are not properly engaged - repeat and vary the 30 degree suggestion slightly.

e. With the tension setting clamp, wind the tension to "6"; hold the tension; lift the plate and reset the counter to "1". Check for correct mesh of pinion and indicator gear - then assemble two screws. Remove the tension setting clamp and rethread the tension snail to the shaft. Screw the snail down until it binds on the plate - then, back off a partial turn until the dog and snail catches engage. Insert spacer (.005" to .010") between the catches, assemble the tension nut and tighten. Check the snail for binding on the plate - if necessary, loosen the locknut and back off snail a full turn, tighten lock nut again and check. Test run several times at high and low tension; then, set tension at "1" and the curtain at "0" invert the camera and release the shutter - the curtain should roll slowly and evenly to the roller and latch with release lever held back - if not, it will be necessary to add more tension - one turn at a time until the shutter operates inverted. This additional tension may be added by removing the plate mounting screws and rotating the plate counterclockwise without disengaging the pinion and indicator gear. Check operation as instructed in paragraph 1 g. Reassemble the four screws when tension is satisfactory.

3. Curtain and roller replacement.

a. If the curtain and rollers are not being replaced as a unit, remove all old cement from the rollers and rough the curtain, and be sure that the ends of the curtain are square which will facilitate in keeping the curtain ends as nearly parallel as possible to the longitudinal axis of the rollers when the parts are cemented together. Examine the curtain for pinholes, tears or weak points.

b. For information of assembly and lubrication of the curtain and tension setting plates, see corresponding paragraphs 1 and 2.

c. Examine the tension roller spring by unscrewing the left bushing, then unscrew the right bushing. Lubricate spring very lightly with recommended light oil or replace tension roller if the spring is badly worn.

d. After the new curtain or roller has been replaced and adjusted, it is additionally cemented to the roller. The top gear roller is set at "0"and released, a line is drawn across the center of the roller which will mark a guide on the inside surface of the curtain. Cement is applied 1/2" wide on this guide line. The lower tension roller is marked with a guide line after the smallest aperture has been wound on the top roller - cement is applied 1/2" wide on this guide line. Reassemble the back and check curtain synchronization contact - reform contact springs if necessary.